



Amendment  
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IN THE SPECIFICATION

Replace paragraph 0016 with the following paragraph.

Referring to Figs. 1 and 2, the pump apparatus 10 of this invention includes a housing 12 for a motor 14 which effects linear motion such as a stepper motor, a lead screw, a rotary solenoid or the like and a motor 16 which effects rotation. Motor 14 is connected to rotor/stator coupling 18 through arm 20 which can be rigid or a self aligning spring drive. The rotor/stator coupling 18 is biased into ceramic rotor 22 by spring 24. Rotor 22 is sealed against ceramic stator 26 at stator flat polished surface 28 and rotor flat polished surface 30. The ceramic rotor 20 and ceramic stator 26 can be formed of aluminum oxide, zirconia, silica, tantalum oxide, or the like. Mating surfaces 28 and 30 are rendered flat such as by a conventional lapping process. Since mating surfaces 28 and 30 are flat, a significantly lower torque force at a given pressure is required to effect rotation of the rotor as compared to a conically shaped rotor and stator.

Replace paragraph 0018 with the following paragraph.

Motor 16 causes gear box 40 to reciprocate through pulley 41, and gears 42, 44 and 46 and gear track 48. Gear box 40 is positioned within track 47 which causes the piston 34 to move in a repeatable linear path stroke after stroke. As shown in Fig. 1, the stroke of the pump varies from position 50 and position 52 which typically can be between about 1.5 and 2.0 inches. It is to be understood that any ~~convention~~ conventional activating apparatus which causes piston 34 to reciprocate on a linear path can be utilized in the present invention.

Replace paragraph 0020 with the following paragraph.

As shown in Figs 2, 3 and 4, the stator 26 is in fluid communication with a fluid inlet 66 in head 26 and with fluid outlet 68 ~~+~~ in head 26. Fluid is introduced into housing 36 through fluid inlet 66 when piston 34 moves away from stator 26. Fluid is passed through fluid outlet 68 when piston 34 moves toward stator 26. The stator 26 includes fluid passageways 70, 72 and 74. When rotor 22 (Fig. 5) is rotated so that the fluid passageway 80 is in position 82, fluid passes from fluid passageway 70 to fluid passageway 74 and then into housing 36. When rotor 22 (Fig. 5) is rotated so that fluid passageway 80 is in position 84, fluid passes from housing 36, through fluid passageway 74 and through passageway 72 to a point of use (not shown).

Replace paragraph 0021 with the following paragraph.

Referring to Fig. 7, a rotor/stator coupling 18 which is a self-aligning spring drive is shown. The coupling 18 includes a spring housing 86, and a spring 88. The spring 88 bears against pin 90 which is movable within slot 92. Pin 90, in turn, bears against pin 94 which fits into slot 96 of rotor 22. Flange 98 fits into slot 100 of rotor 22. Housing ~~96~~ 86 is coupled to arm 20 (Fig. 1) by keyway ~~102~~ 101 which fits over a key (not shown) of arm 20 (Fig. 1). When arm 20 is rotated, the rotation is transmitted to rotor 22 through flange 98 and slot 100. It is important to have complete flat contact between surface 28 and 30 so that there is no leakage between position 82 and 84 (Fig. 5). By the term "complete flat contact" as used herein is meant that flat surfaces 28 and 30 do not separate to effect partial contact between them. This complete flat contact is effected even when arm 20 ~~on~~ and housing 86 are misaligned since pin 94 rotates within slot 96 and the misalignment is thereby corrected and not transmitted to surface 30 of rotor 22.

Replace paragraph 0023 with the following paragraph.

Referring to Fig. 9, an embodiment of this invention is shown having the capability of washing internal seals. Bottom housing section 108 is attached to middle housing section 106 by threads. Bottom section 108 is provided with seals 112 and 114 through which a piston (not shown) extends. Bottom section 108 is provided with inlet conduit 116 and outlet conduit 118 through which a wash liquid can be passed. The wash liquid is used to wash seals 112 and 114 as well as the interior of housing sections 106 and 108 thereby to prevent build-up at a deposit therein from liquid being pumped therein. Washing can be effected when a top surface of a piston (not shown) extends below conduits 106 and 108.